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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/565,493	01/20/2006	Toshio Takchara	F8912	2083

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EXAMINER	
FLANIGAN, ALLEN J	

ART UNIT	PAPER NUMBER
3744	

MAIL DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/565,493	TAKEHARA ET AL.	
	Examiner	Art Unit	
	Allen J. Flanigan	3744	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4,6 and 7* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,6 and 7* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 4, and 6 are rejected under 35 U.S.C. 102(b) as being anticipated by Higashi.

Higashi shows an annular heat pipe with capillary grooves formed in the facing surfaces of the outer and inner pipes that form the annulus to wet the surfaces via capillary action (see the Figs. 6 & 7 embodiment). See also lines 12-15 of column 5 regarding the claimed liquid level of working fluid.

Regarding claim 4, this claim merely recites an inherent property of virtually any annular heat pipe design such as Higashi's (the ability to provide for heat flow either radially outwardly or radially inwardly). Note also the bridging paragraph of columns 5 and 6, which discusses the advantages of having grooves on the inner surface of the outer cylindrical member; heat can be absorbed by the outer cylinder and transferred both axially and to the inner cylinder (in reverse of the heat flow direction when the gun is being fired, where heat flows from the inner cylinder to the outer).

Regarding claim 6, the hot propellant gases flowing through the gun barrel of Higashi in use are clearly readable on the claimed "thermal source fluid" that is allowed to "flow through the inner tube".

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Higashi, particularly in view of Grover et al.

The formula given in claim 2 appears to mainly specify conditions under which a groove can exert a capillary force on a liquid to permit wicking of the working fluid in liquid form. It is well understood in the art that this wicking action is the desired function of various wick formations, be they grooves, foam, woven screens, etc. and it would have been well within the level of ordinary skill in the art to determine the optimum groove dimensions to provide the optimum or desired wicking action for a given working fluid. Note in particular the statement in the first full paragraph of column 6 of Grover et al., which provides explicit confirmation of the obviousness of optimizing capillary groove dimensions in heat pipes.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yatsuhashi et al. in view of Higashi.

Yatsuhashi et al. show an embodiment (Fig. 4) in which the inner pipe of an annular heat pipe is offset to allow immersion of the inner pipe in liquid working fluid (see paragraph in the middle of column 5). Yatsuhashi et al. also

disclose the use of wicking on the inner surface of the outer tube in the instance where the heat flow is radially inwardly.

Higashi teaches the equivalence of wicking layers formed of woven gauze with capillary grooves, and also teaches the use of such wicking features on both the facing surfaces of the annular heat pipe (as noted in the rejection of claim 4, the flexibility of providing grooves on both these surfaces in terms of allowing multidirectional heat flow in the annular heat pipe is discussed in Higashi). Thus, it would have been obvious to one of ordinary skill in the art at the time the instant invention was made to form capillary grooves in both facing surfaces of the annular heat pipes of Yatsuhashi et al. to provide efficient wetting of the heat absorbing surface, and flexibility in the direction that heat may flow in the annular heat pipe.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Higashi in view of Masters.

Higashi employ an annular heat pipe for cooling of a gun barrel. The use of heat pipes, and in particular annular designs employing concentric pipes, for ground-installed applications is known in the art as shown by Masters. Thus, it would have been obvious to one of ordinary skill in the art at the time the instant invention was made to employ the specific annular heat pipe design of Higashi in place of the flexible inner or outer bladder design of Masters in a ground installed application.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The remaining references cited show various annular heat pipe designs.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Allen J. Flanigan whose telephone number is (571) 272-4910. The examiner can normally be reached on M-F 9:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cheryl Tyler can be reached on (571) 272-4834. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Allen J. Flanigan
Primary Examiner
Art Unit 3744

AJF